

American scientist

SIGMA XI QUARTERLY

Vol. XVIII

MARCH, 1930

No. 1



CONVENTION NUMBER PARKER ON "HUMAN BIOLOGY"

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OFFICERS OF SIGMA XI

President.....	G. W. STEWART
	State University of Iowa, Iowa City, Iowa
Secretary.....	EDWARD ELLERY
	Union College, Schenectady, N. Y.
Treasurer.....	GEORGE B. PEGRAM
	Columbia University, New York City

EXECUTIVE COMMITTEE

WILLIS R. WHITNEY.....	General Electric Co., Schenectady, N. Y.
	<i>Term expires January, 1931</i>
GEORGE A. BAITSELL.....	Yale University, New Haven, Conn.
	<i>Term expires January, 1932</i>
DR. LOUIS B. WILSON.....	Mayo Foundation, Rochester, Minn.
	<i>Term expires January, 1933</i>
F. E. LLOYD.....	McGill University, Montreal, Canada
	<i>Term expires January, 1934</i>
LEON J. COLE.....	University of Wisconsin, Madison, Wis.
	<i>Term expires January, 1935</i>
F. R. MOULTON.....	Chicago, Ill.
	<i>Term expires January, 1932</i>
C. E. DAVIES.....	29 West 39th St., New York City, Alumni Representative
	<i>Term expires January, 1930</i>

ALUMNI COMMITTEE

C. E. DAVIES.....	Rensselaer '14, New York
FREDERICK B. UTLEY.....	Yale '03, Pittsburgh, Pa.
HUGH P. BAKER.....	Syracuse '13, Washington
DONALD H. SWEET.....	Case '13, Chicago
CLARENCE F. HIRSHFELD.....	Cornell '03, Detroit

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G. W. STEWART

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TO THE CHAPTERS OF SIGMA XI

The Society of Sigma Xi is in a flourishing condition, the best in its history. It is well organized and its chapters are active and encouragingly effective. But naturally such gratifying conditions within the organization should not decrease one's anxiety that the Society shall fulfill its primary function, that is, the direct encouragement of research in pure and applied science. The opportunity of our organization is unique. Its active members are in immediate contact with youth of college age. The real power of any chapter must basically depend upon the actual accomplishment of creative work by its members. The organization of Sigma Xi does not relieve its members of personal responsibility in research but it enhances the influence of their individual efforts. While heartily wishing the Society as an organization to prosper and to command a reasonable share of the active interest of its members, I am not unmindful that productive zeal for research is more essential than organization. May it supply the motive in all our activities!

To every chapter, greetings!

G. W. STEWART

EDITORIAL COMMENTS

The thirtieth annual convention of our great society was impressive for many reasons, among them the fact that it was the largest convention the organization has held within the last five years. Thirty-six of the fifty institutional chapters were represented by one or more delegates, and twelve of the twenty-two clubs. The record since 1925 is as follows:

CHAPTERS PRESENT

1925, Kansas City, 23 of the 42 chapters, or 54.7%
1926, Philadelphia, 24 of the 45 chapters, or 53.3%

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1927, Nashville, 27 of the 46 chapters, or 58.7%
 1928, New York, 31 of the 50 chapters, or 62.0%
 1929, Des Moines, 36 of the 50 chapters, or 72.0%

CLUBS PRESENT

1925, Kansas City, 9 of the 13 clubs, or 69.2%
 1926, Philadelphia, 4 of the 15 clubs, or 26.6%
 1927, Nashville, 6 of the 15 clubs, or 40.0%
 1928, New York, 5 of the 17 clubs, or 29.8%
 1929, Des Moines, 12 of the 22 clubs, or 54.5%

The national officers are gratified at this showing. The business of the society is very important. The officers ask and need the many suggestions that are made on the floor of the convention. The larger the attendance, the more helpful is the convention in assisting the officers to carry the responsibilities of their positions. By the time this issue of the *QUARTERLY* is in the hands of the members and associates, the various delegates will have reported the convention to the chapters. Will chapter officers or delegates make comment and suggestion about the convention and the society affairs to the national officers. The Spring Meeting of the executive committee will be held in April, and every comment and suggestion will be given careful and grateful consideration. Our society grows in importance and influence every year. The executive officers need and court constructive criticisms from our members.

* * * * *

The following table shows in detail how the attendance at the last five conventions was distributed among the chapters.

OFFICIAL DELEGATES AT THE LAST FIVE CONVENTIONS

CHAPTER	1925	1926	1927	1928	1929
Cornell	1	1	2	3	1
Rensselaer	1		(1)*	1	
Union		2	1	(2)*	1
Kansas	2		1	2	2
Yale	1	1	1	2	1
Minnesota		1	1	1	3
Nebraska	1	1	2	1	3
Ohio		1	1		2
Pennsylvania	2	2	2	2	2
Brown		1			1
Iowa	1	1	1	1	1

Stanford	1		1	1	1
California			1		1
Columbia	1	1		1	1
Chicago	2	1	1	1	3
Michigan	1		2		
Illinois	2	1	2	2	2
Case		1	1	2	
Indiana	2	1	3		2
Missouri	1		1		3
Colorado	1		(1)*	(1)*	2
Northwestern		2	1	1	3
Syracuse		1	1		1
Wisconsin		1	(1)*	1	3
University of Washington	1		1		
Worcester			1		
Purdue	1		1	1	2
Washington University	1		(1)*	1	3
District of Columbia					
Texas	2		1	2	
Mayo Foundation	1		(1)*	1	2
North Carolina				1	
North Dakota	1	1			1
Iowa State College (Ames)		1		1	3
Rutgers		1		1	
McGill			1		
Kentucky	1			2	1
Idaho				1	
Swarthmore		2	(1)*	2	1
Oregon				1	1
Virginia	2	2	1	(2)*	
Johns Hopkins		1			3
Calif. Inst. of Technology					1
New York University (as club)	1		(1)*	1	(1)*
Univ. of Cincinnati			(3)*		(1)*
Michigan State College (as club)	1		1	1	2
Arizona (as club)	2			2	1
Lehigh				2	1
Maryland				2	(3)*
Kansas State College (as club)	1	1	2		3
Coll. of Med. of U. of Illinois				1	1

* Delegates reported as appointed, but not reported present at convention.

SIGMA XI CLUBS AT THE LAST FIVE CONVENTIONS

NAME	1925	1926	1927	1928	1929
Oklahoma (Univ. of)	2	3	2		2
Southern California					1
Duluth					

SIGMA XI CLUBS AT THE LAST FIVE CONVENTIONS—*Continued*

NAME	1925	1926	1927	1928	1929
Carleton College	1			1	1
University of Denver	1				
Oregon State Agr. College					1
West Virginia University			1		1
University of Maine				3	1
University of Pittsburgh		1		1	
University of Wyoming			1		1
University of Florida	1	1	2		1
University of Rochester				1	
Colo. Agricultural College					1
State College of Washington	1		1	1	1
Univ. of South Dakota					1
Louisiana State University					1
University of Alabama					
Univ. of California at Davis					1
Univ. of Utah					
Clark University					
St. Louis University					

* * * * *

Chapter secretaries have all received the new order blanks and illustrative sheets of the society's insignia. The change in the form of the associate emblem is a marked improvement. The single letter "Sigma" as a pendant more worthily represents the society, and when the associate is promoted to membership the letter "Xi" can be added, thus completing the member emblem without loss of the insignia already purchased by the associate. The number of orders for the new form of associate emblem received since the convention voted the change indicates the popularity of the pendant as compared with the pin. We are prepared to fill orders for all emblems within a period of ten days after their receipt. We ask all purchasers to inform us at once of failure to receive their emblems promptly.

LIST OF MISSING PERSONS

Can You Help Us Locate These Members?

<i>Name</i>	<i>Chapter</i>	<i>Last Known Address</i>
Blew, Michael J.	Ind. 1916	Dept. of Chemistry, Indiana University, Bloomington, Ind.
Blier, Zachary Abraham	Chicago 1928	Executor of Bureau of Biological Survey in N. Mexico, Chamber of Commerce, Albu- querque, New Mexico
Bliss, Charles F.	Minn. 1915	
Bliss, Guy L. (Dr.)	Chicago 1907	508 Harselman Build- ing, Kalamazoo, Mich.
Bliss, Howard Hamilton	Calif. 1909	1584 Hopkins Street, Oakland, California
Blodgett, Hugh C.	Calif. 1925	14 Mosswood Road, Berkeley, Calif.
Bloom, John R.	Minn. 1927	624 Hudson Avenue, West New York, New Jersey
Bloomfield, Grover	Columbia 1922	
Bloomsburg, Ralph A.	Columbia 1919	
Bloxham, T. Earl	Case 1909	12209 Hillside Ave., Richmond Hill, New York
Boak, Ruth Alice	Cornell 1928	Auburn, N. Y.
Bock, C. W.	Missouri 1913	1618 South Compton, St. Louis, Missouri
Bock, Paul Theodore (Major)	Illinois 1913	Brooks Field, San An- tonio, Texas
Bodfish, Howes	Chicago 1921	Pacific Fleet, U. S. N., c/o Postmaster, San Francisco, Cal.
Boehm, Walter Martinus	Iowa 1902	Fairview Road, Llan- erch, Penn.
Boggs, John S. (or A.)	Penn. 1907	Boulder, Colorado
Boller, Ernest Russell	Colo. 1925	Marion, Ind.
Bolles, Myrick N.	Purdue 1926	Flaudrian, S. Dakota
Bolme, Ole M.	Columbia 1904	12 Park Row, New York City
Bolyard, Garrett Lincoln	Minn. 1910	1216 W. Colorado Ave- nue, Colorado Springs, Colo.
Bond, John David (Dr.)	Chicago 1923	Texas A. and M. Col- lege, College Station, Texas
Bond, Lewis A.	Mich. 1920	2237 Durant Avenue, Berkeley, Calif.
Bonnet, Edwin Spilman	Calif. 1921	90 The Consolidation Coal Co., Coalwood, West Virginia
Bontwell, L. R.	Ohio 1909	180 Claremont Avenue, New York City
Booher, Lela E.	Missouri 1914 Columbia 1927	

Boomer, Herbert Edward	McGill 1923	
Booth, John Franklin	Cornell 1926	
Borchers, Perry Elmer	Ohio 1907	151 Park Street, Dayton, Ohio
Bore, Leslie Myron	Washington 1917	
Borsuck, Robert	Columbia 1917	
Bose, Emil	Texas 1916	2a Flores 29, Mexico D. F., Mexico
Boss, Lawrence Wade	Yale 1919	12 Prospect Place, New Haven, Conn.
Bost, Frank	Kansas 1916	
Boulden, John Searles	Washington 1919	
Bowen, Arnold Everett	Yale 1921	112 College Street, New Haven, Conn.
Bowers, Nathan Abbott	Stanford 1926	Burlingame, Calif.
Bowes, Orlando C.	Columbia 1916	
Bowes, Robert Barton	Yale 1927	Sheffield Scientific Sch., Yale University, New Haven, Conn.
Bowles, Oliver (Dr.)	Minn. 1911, Rutgers	U. S. Bureau of Mines, Rutgers University, New Brunswick, N. J.
Bowman, K. B.	Case 1922	455 S. Main Street, Bowling Green, Ky.
Boyd, Oran Cecil	Cornell 1923	Cornell University, Ithaca, N. Y.
Boyd, Robert Allen	Washington 1927	
Boyd, Walter Harrington	Stanford 1923	1104 High Street, Palo Alto, Calif.
Bracken, Henry M.	Minn. 1904	Palomar Apartments, San Diego, Calif.
Braden, Rene A.	Minn. 1923	University of Minnesota, Minneapolis, Minn.
Braford, Caty Josephine	Univ. of Washington	Seattle, Washington
Bragg, Gilbert A.	Kansas 1912	Thompson, Nevada
Brain, Charles Kimberlin	Ohio 1912	Brooklyn-Pretoria, Pretoria, South Africa
Brainerd, Arthur Edward	Syracuse 1911	Holdenville, Okla.
Brainerd, William Francis	Syracuse 1921	709 Masonic Empire Bldg., Bartlesville, Okla.
Brakeley, Elizabeth	Columbia 1920	306 W. 109th St., New York City
Bramhall, Lillian	Oregon 1928	682 Tillamook Street, Portland, Oregon
Brand, Herbert A.	Illinois 1908	1957 Conway Building, Chicago, Illinois
Brand, Royden Earle	Illinois 1909	Farm Bureau, Albany, N. Y.
Branham, Joseph Russell	Virginia 1924	George Rogers Clarke Apts., Charlottesville, Va. (and) Dept. of Chemistry, Univ. of Virginia, University, Va.
Brann, George Edman	Purdue 1925	1802 Thompson Street, Lafayette, Ind.
Branom, Mendel Everett	Chicago 1916	4018 Magnolia Place, St. Louis, Missouri

MINUTES OF THE MEETING OF THE EXECUTIVE COMMITTEE OF SIGMA XI, DES MOINES, DECEMBER 28, 1928

The second meeting of the Executive Committee for 1929 was held in the Hotel Ft. Des Moines, Des Moines, Iowa, December 28, 1929. The meeting was called to order at 2:00 P.M. by President Moulton. Those present were: President Moulton, Secretary Ellery, Professor Baitzell, and Dr. Wilson.

Business was transacted as follows:

1. FORMAL PETITIONS:

Formal printed petitions were presented from:

University of Wyoming
University of Oklahoma
State College of Washington
University of Rochester
Pennsylvania State College

It was

Voted—To present each of these petitions to the convention with the recommendation to favorable action in each case.

2. REPORTS FROM OFFICIAL VISITORS:

Dean Pegram presented a written report of his visit to the *University of Pittsburgh* on Thursday, December 12, and stated that his attention was concentrated in the main on three points:

- (1) The present resources in personnel, equipment, and the established activities of the more important scientific departments of the university.
- (2) The developments that seem probable within the next few years.
- (3) The question of whether the personnel represented by the petitioning group and those who are likely to be associated with them later can be expected to sustain a chapter of Sigma Xi at a level of activity and usefulness in proportion to the opportunities in this institution.

The report included details of observations made in various departments, and Dean Pegram stated that "*in general, and on the above three points particularly, my opinion is favorable to the granting of a*

charter at the University of Pittsburgh. My general impression is that the present personnel and activity of the scientific departments is such as to justify in these respects the granting of a charter."

After considering the report, it was

Voted—To request the petitioning group at the University of Pittsburgh to present a formal petition for the consideration of the committee at its next meeting.

3. ASSOCIATION OF COLLEGE HONOR SOCIETIES:

It was

Voted—That the officers of this organization be informed that Sigma Xi would withdraw from the organization at the close of 1929.

4. SITUATION AT STANFORD:

At the New Haven meeting, April, 1929, Dr. Durand was asked to report on the activities of the Stanford chapter. Dr. Durand reported by letter as follows:

"The present officers of Sigma Xi, President, Vice-President, and Secretary, hold at the same time the same offices in the Science Association. There are planned for the present year a number of scientific meetings, the first of which is scheduled for December 7, under the joint auspices of both organizations and at which, of course, the common President will preside. This appears to be the most practical way of bringing about the end desired and as time goes on the way is going to become easier for the assumption of the whole responsibility by Sigma Xi."

The report was received and ordered placed on file.

5. DISTRICT OF COLUMBIA CHAPTER:

At several previous meetings the Executive Committee had instructed the Secretary to request the officers of the District of Columbia Alumni Chapter to relinquish its charter. The Secretary reported that, following his latest request—made after the meeting in New Haven, April, 19 and 20—the District of Columbia chapter reported election of new officers and some of its activities.

It was

Voted—That no further action be taken at the present time with reference to a surrender of the charter of the District of Columbia Chapter.

6. COMMITTEE ON DIPLOMAS:

Personnel: Moulton, Ellery, Baitzell, Davies.

Professor Baitzell and Mr. Davies of the committee reported that they had had some correspondence with printers regarding a new

form of certificates for membership and associateship. Owing to limited time at the disposal of the committee—preceding the convention—it was

Voted—That consideration of the report of the committee on diplomas be postponed until the Spring meeting.

7. NOMINATING COMMITTEE:

President Moulton announced to the Executive Committee that he had appointed as nominating committee:

PROFESSOR WARD of Illinois, *Chairman*

PROFESSOR LINDSTROM of Iowa State College

PROFESSOR MATHERS of Indiana University

Announcement of the appointment of this committee appeared in the September and December issues of the *QUARTERLY*.

8. OFFICERS' REPORTS:

The President, the Secretary, and the Treasurer presented their annual reports.

(These appear in full in this issue of the *QUARTERLY*.)

9. THE SHALER WILLIAMS MEMORIAL FUND:

The Secretary read letters from Professors Ward and Richtmyer regarding a proposed research fund to be established at Cornell University in honor of HENRY SHALER WILLIAMS, one of the founders of the Society of the Sigma Xi.

The Executive Committee instructed the Secretary to inform those who are responsible for the fund that Sigma Xi views with sympathy and interest the creation of such a memorial research fund, but that it does not feel that it can divert any of the Sigma Xi Alumni Research Fund to the proposed Williams Fund, and that the active finances of the society do not permit the society to participate in the proposed fund.

The Committee adjourned at 4:00 P.M., the hour for the business session of the convention.

EDWARD ELLERY, *Secretary*

PROCEEDINGS OF THE THIRTIETH CONVENTION OF THE SIGMA XI

The Thirtieth Convention of the Society of the Sigma Xi was held in the Hotel Fort Des Moines, Des Moines, Iowa, December 28, 1929. President Moulton called the business session to order at 4:00 P.M. and appointed the Committee on Credentials as follows:

Professor H. J. Creighton, Swarthmore

Dean M. E. Haggerty, Minnesota

Professor A. C. Leonard, North Dakota

The Committee received the credentials of delegates and reported the following chapters and clubs represented:

CHAPTERS

Cornell.....	R. C. Gibbs
Rensselaer.....	
Union.....	Edward Ellery
Kansas.....	P. B. Lawson
	E. B. Stouffer
Yale.....	G. A. Baitzell
Minnesota.....	R. N. Chapman
	M. E. Haggerty
	O. M. Leland
Nebraska.....	G. L. Peltier
	D. A. Worcester
	Emma N. Andersen
Ohio.....	Herbert Osborn
	J. H. Schaffner
Pennsylvania.....	Rodney H. True
	C. E. McClung
Brown.....	A. M. Banta
Iowa.....	J. F. Reilly
Stanford.....	E. W. Schultz
California.....	J. H. Hildebrand
Columbia.....	W. L. Severinghaus
Chicago.....	G. K. K. Link
	W. C. Allee
	H. G. Gale
Michigan.....	
Illinois.....	H. B. Ward
	F. B. Seely
Case.....	
Indiana.....	Paul Weatherwax
	R. R. Ramsey

Missouri.....	L. J. Stadler
	M. F. Miller
	E. S. Haynes
Colorado.....	W. B. Pietenpoe
	T. D. A. Cockerell
Northwestern.....	L. I. Bockstahler
	K. K. Smith
	Joseph Simons
Syracuse.....	George Hargitt
Wisconsin.....	R. A. Brink
	L. J. Cole
	E. M. Gilbert
Univ. of Washington.....	
Worcester.....	
Purdue.....	R. G. Dukes
	H. R. Kraybill
Washington Univ.....	E. S. Reynolds
	L. A. Du Bridge
	A. M. Shawalter
District of Columbia.....	
Texas.....	
Mayo.....	C. Sheard
	H. E. Essex
North Carolina.....	
North Dakota.....	A. G. Leonard
Iowa State.....	E. W. Lindstrom
	Miss Mary McLaughlin
	J. W. Woodrow
Rutgers.....	
McGill.....	
Kentucky.....	H. H. Jewett
Idaho.....	
Swarthmore.....	H. J. Creighton
Oregon.....	H. J. Sears
Virginia.....	
Johns Hopkins.....	K. F. Herzfeld
	L. M. Berthoff
	R. D. Manwell
California Inst.....	R. A. Millikan
New York Univ.....	H. W. Stunkard*
Univ. of Cincinnati.....	M. H. Povah*
Michigan State.....	V. R. Gardner
	D. T. Ewing
Arizona.....	E. D. Ball
Lehigh.....	N. H. Heck
Maryland.....	E. C. Auchter
	E. N. Cory
	S. W. Wentworth*

* Appointed, but not present.

Kansas State.....	E. C. Miller
	A. M. Brunson
	G. A. Dean
College of Medicine, Univ. of Ill.....	William H. Welker

CLUBS

Oklahoma.....	C. N. Gould
	William Schriever
Southern California.....	B. M. Allen
Duluth.....	
Carleton College.....	F. F. Exner
University of Denver.....	
Oregon State Agr. College.....	Don C. Mote
West Virginia University.....	P. D. Strausbaugh
University of Maine.....	W. F. Dove
University of Pittsburgh.....	
University of Wyoming.....	
University of Florida.....	W. B. Tisdall
University of Rochester.....	
Colorado Agricultural College.....	R. V. Lott
State College of Washington.....	H. E. Culver
University of So. Dakota.....	E. P. Churchill
Louisiana State Univ.....	O. W. Rosewall
University of Alabama.....	
University of Arkansas.....	
University of California at Davis.....	S. B. Freeborn
University of Utah.....	
Clark University.....	
St. Louis University.....	

Thirty-six of the fifty institutional chapters were represented at the convention, the largest representation since 1925.

Two chapters had appointed delegates who were not present at the convention.

Twelve of the twenty-two clubs were represented at the convention.

The following officers were present:

President: F. R. Moulton, Chicago

Secretary: Edward Ellery, Union College

Executive Committee: George A. Baitsell, Yale

Louis B. Wilson, Mayo Foundation

The account of the proceedings of the 29th convention of the Society at New York, December 28, 1928—published in the March, 1929, *QUARTERLY*—was approved as printed. President Moulton gave

his annual report (see page 29—this issue). The annual report of the Secretary was read (see page 31—this issue). The annual report of the Treasurer was presented by the Secretary and was referred to an Auditing Committee consisting of: Professor F. W. Hehre, and Professor W. A. Curry of Columbia University (see page 35—this issue).

The President, on behalf of the Executive Committee, presented printed petitions for charters for chapters from groups at the following institutions:

University of Wyoming
University of Oklahoma
State College of Washington
University of Rochester
Pennsylvania State College

The President also stated that each of these petitions had been under consideration by the Executive Committee for a period of years and that the committee recommended favorable action by the convention. Each petition was presented to the convention separately. Upon roll-call in each case, the vote of the convention was unanimously in favor of granting the petition. The officers were directed to proceed with the installation of chapters in each of these institutions.

The following amendments to the national constitution were proposed:

1. That Article VI, Section 1, be changed to read as follows:

"On the reverse side or back of the badge shall be engraved the name of the chapter in which the owner was initiated, together with the date of such initiation, and the owner's name."

This proposed amendment omits from the engraving at present required the date of the formation of the chapter.

2. That Article VI, Section 1, be changed to read as follows:

"The badge or symbol to be worn by associates shall be the single letter SIGMA in the form of a key. On the reverse side shall be the associate's name, the name of the chapter in which the associate was initiated, and the date of the initiation."

This proposed amendment changes the form of associate emblem from a pin to a key.

The Secretary announced that all requirements of the constitution respecting amendments had been met—*i. e.*, publication in the official journal of the society 90 days before the convention. The Secretary explained to the convention the meaning of the first amendment and

Professor Baitsell of the Executive Committee presented the reasons for the second amendment. Upon motion it was unanimously voted that both amendments be adopted and the Secretary was directed to incorporate them in the printed constitution of the society.

Upon motion, the resolution presented by the Cornell chapter at the 29th convention and laid upon the table at that time was taken from the table and President Moulton declared discussion upon the resolution in order. The resolution reads as follows:

"WHEREAS, It is not desirable at this time to attempt to define scientific research in terms of either method or subject matter,

"BE IT RESOLVED, That noteworthy contribution to (or promise of notable accomplishment in) scientific investigation shall constitute eligibility for election as member (or associate) of Sigma Xi regardless of the field in which the candidate may be working. Each separate chapter shall be responsible for the interpretation of this principle in election to its membership or associateship."

Professor Gibbs, Cornell, opened the discussion. He was followed by representatives from many chapters. After full discussion, it was

Voted—That the resolution be referred to the Executive Committee with power to take such action as in its judgment would best serve the purposes of the society.

Upon motion of the Secretary, who acted for the Treasurer, the convention voted that the usual assessment on the several chapters of \$1 per enrolled member and associate be levied for 1930.

President Moulton announced that a Nominating Committee had been appointed consisting of:

PROFESSOR WARD, Illinois, *Chairman*
PROFESSOR LINDSTROM, Iowa State College
PROFESSOR MATHERS, Indiana University

and that statement of such appointment had been published in the September issue of the *QUARTERLY*. He called upon the committee for its report. Professor Ward responded for the committee with the following suggestions for officers:

For *President*..... PROFESSOR G. W. STEWART, Iowa
For *Secretary*..... DEAN EDWARD ELLERY, Union
For *Treasurer*..... DEAN GEORGE B. PEGRAM, Columbia

All these to serve for the ensuing biennium.

For *Member of the Executive Committee* to serve 5 years:

PROFESSOR LEON J. COLE, Wisconsin

For *Member of the Alumni Committee* to serve 5 years:

MR. C. E. DAVIES, New York

It was

Voted—That the report of the Nominating Committee be adopted and that the Secretary be empowered to cast a ballot for the officers named.

The Secretary announced that the vote had been cast and the President declared the officers duly elected.

Upon motion of the Secretary, the convention voted an expression of appreciation to Mr. J. Woolson Brooks (Pennsylvania 1920, who acted as local representative of the society in the preliminary arrangements for the meetings), to Dr. D. W. Morehouse of Drake University, to Mr. Hamilton and to Mr. Jean Carroll, of the Des Moines Chamber of Commerce, for assisting so materially in making the arrangements for the annual meetings of the society.

The convention adjourned at 6:00 P.M. for the annual dinner.

ANNUAL DINNER

The annual dinner of the society was given in the Hotel Fort Des Moines at 6:30 P.M. The manager of the hotel had shown deep interest in our plans, and he and all his staff worked enthusiastically to make this part of the annual meetings a delightful event. About 125 members, associates and guests of the society were present. At President Moulton's table were the officers of Sigma Xi, the retiring President of the Association—Dr. Henry Fairfield Osborn—and the acting President of the Association, Professor Robert A. Millikan. The dinner was held in the large ballroom of the hotel, and was followed immediately by the eighth annual Sigma Xi address, delivered by Professor George H. Parker, of Harvard University, on "Some Aspects of Human Biology," which was given in the Shrine Temple.

EDWARD ELLERY, *Secretary*

SOME ASPECTS OF HUMAN BIOLOGY

GEORGE H. PARKER, PROFESSOR OF ZOOLOGY, HARVARD UNIVERSITY.
Eighth Annual Sigma Xi lecture, given at Des Moines, Iowa, December 28, 1929, under the joint auspices of the Society of the Sigma Xi and the American Association for the Advancement of Science

It is my intention to discuss with you the basis of human actions. To be concrete, how does it happen that I am standing here before you, clothed in a particular way, and forcing my breath in irregular pulses over my vocal cords so as to produce a succession of sound vibrations that pass across the air, reach your ears, and excite in your minds ideas more or less like my own? Such activities illustrate the immense complexities of human relations and call for understanding. I do not mean that in this address I shall solve this general problem, but if we consider the question for a short time, we may come to a clearer understanding of its possibilities.

In my opinion there are two springs of human action. The first of these has its source in what we are taught—in what I may call our social inheritance. The second arises in what we bring with us into the world—our organic inheritance. These two sources seem to me to cover all possible human behavior. I am aware that some scholars have declared in favor of innate abilities, but so far as I can see, these always resolve themselves into either a form of social inheritance or of organic inheritance or of some combination of these. I have never been able to persuade myself that we possess anything more than what we receive from society by learning, and what we bring into the world through our organic nature.

When we examine the way in which we receive these influences, we are immediately confronted with the general process of inheritance, for this seems to lie at the base of both our social and our organic acquisitions. The term inheritance as used by the biologist is a figure of speech. Inheritance originally is a legal operation. When death occurs and a piece of property is handed from the deceased person to a survivor, we have an example of real inheritance, a legal process that is made possible by a certain degree of civilization. The biologist sees that a given child possesses some characteristics of the mother and some of the father, and these similarities he attributes to what he calls inheritance. When a child has eyes like those of its mother, we commonly say that it has inherited this

feature from the maternal parent, but we know perfectly well that the mother's eyes have not been handed down to the child as a piece of property may be. All that is passed on is some obscure tendency which produces in the child the same kind of eye that the mother possessed. In a similar way habits are passed on, not by an immediate transfer, but by a process of imitation, and thus both organic and social inheritance are operations which resemble in a superficial way legal inheritance. Biologists use the term "inheritance" therefore as a figure of speech and not to indicate a process such as occurs in the transfer of property.

In organic inheritance we deal with the immense range of physical traits wherein the child resembles the parent. These include color of eye and of hair, complexion, stature, and a thousand other obvious external and internal anatomical conditions that make the child like its progenitors. As a rule, these traits are not open to subsequent modification. Physical exercise may change somewhat the proportions of the body, but the color of the eye remains constant for life, and even the tricks of the trade on the hair do not involve permanent changes. As a rule organic inheritance stamps the person with a high degree of permanent individuality.

Social inheritance is illustrated by the innumerable activities that we learn from our early childhood. Perhaps the most striking of these is language. Everyone is aware that the language of a child is the language of its immediate environment and not of its racial history. An English child brought up in France speaks French. I know of a family of American children brought up in China who speak the Chinese language in a way indistinguishable from a thorough-bred Chinaman. Language is thus learned by example from our environment, as well as are a thousand other such social traits. Among lower creatures this is not necessarily so. If we look upon the sounds of beasts and birds as their natural language, we will find that this language is as a rule inborn, that is, organic, in contrast with our language, which is essentially social. The cuckoo in Europe, and the cowbird in America, lay their eggs, as you well know, in the nests of other birds. Their young are hatched in these foreign situations; nevertheless the young cuckoo and the young cowbird produce notes that are characteristic of their kind, and have no relation whatever to the songs of their foster-parents. In the cuckoo and the cowbird language is an organic inheritance, like the color of our eyes, and is not social in its source, as our language is.

Our social inheritances depend upon learning and teaching. Learning is an animal process which reaches down to very primitive creatures. You may be surprised to know that such simple animals as earthworms may learn. An earthworm may be placed in a narrow passage-way and made to creep to a point where this passage-way turns right and left. Many trials on many earthworms show that these animals will turn right or left in equal numbers of times. If now some irritating agent is placed in one of these passage-ways so that every time the worm takes the given course it is vigorously stimulated, the worm will in a few weeks learn to turn in the opposite direction and never make a failure in this lesson. Such simple acquisitions are retained by the worm for some considerable time, and remarkable as it may seem, they still persist, even after the animal's head has been cut off and regeneration has been accomplished. This shows that such lessons are imbedded in the general nervous system of the worm rather than in the head of the animal. I am not aware that learning is of much significance below such creatures as worms. Jellyfishes, sea-anemones, and other simple animals show little or no evidence of this capacity.

Our social inheritance is not only dependent upon our capacity to learn, which as I have just shown is shared by many other creatures but also by our ability to teach. Teaching, unlike learning, is restricted to only the highest members of the animal kingdom. Probably birds take some slight steps in teaching their young, and kittens in their play are probably taught by the mother, but the so-called "school of the woods" that was once a favorite topic with nature writers probably has no real existence. Teaching is primarily a human characteristic and is our method of substituting a form of play-activity for actual experience in life. As ordinarily practised it never reaches the stage of a full realization. Teaching is always a more or less fictitious affair, yet it prepares for life in a reasonable way and leads to that kind of learning which comes from the world of reality. Human teaching, coupled with the great capacity to learn that man possesses, lies at the basis of his social inheritance.

Organic inheritance is accomplished through the germinal elements, the egg and the sperm. The remarkable characteristic of this type of inheritance is the immense influence of very small amounts of material. The human egg is a minute sphere measuring about one hundred eighty-fifth of an inch in diameter. At this stage one hundred and eighty-five persons placed in a row cover just one inch. The

amount of substance contained in the egg is necessarily extremely small, and yet it is this substance that impresses upon the child all those organic traits that the mother transmits. If the real physical basis by which the mother thus transmits to the child is small, that which serves for the father is immensely smaller. The male sperm cell is a minute filament whose length is about one-fourth the diameter of the egg cell and whose volume has been estimated as approximately one thirty-five thousandth the volume of the egg. Nevertheless it is as influential in organic inheritance as the egg, for we know that children take after their fathers as much as they do after their mothers in organic inheritance. When one sees in a boy or girl the detailed physical traits that have been previously seen in the father, and when one recalls that his inheritance is dependent upon such a minute amount of living substance, it seems almost inconceivable that this is the true explanation of the resemblance. Nevertheless, this has been proved again and again, and we have not the least ground for suspicion that organic inheritance is not accomplished by the living substance contained in the egg and the sperm.

In any endeavor to improve man's state, we must take steps to change in a favorable way his real nature. We have seen that the sources of this nature are his social and his organic inheritances. We must therefore learn to distinguish in him what traits are dependent upon the social type of transfer, and what upon the organic type. The social type, as represented by the environmental influences of education and the like was commonly supposed to be the all-important element. If a person had opportunities for education and advancement it was believed that society had given him all that was his due. The organic side of his nature was regarded as wholly secondary, but we are now beginning to perceive that this organic side needs attention and it is becoming more and more apparent that in dealing with man's betterment we must know with certainty whether this or that peculiarity springs from a social or an organic source. To determine these sources is one of the greatest difficulties in human biology. The problem cannot easily be solved, because we are for the most part such unique creatures. Without attempting to go into the details of this problem, I may say at once that egg cells and sperm cells are so immensely diverse that the particular combination that gives rise to a given individual can scarcely be expected ever to repeat itself. Hence we lack what

may be called a standard of reference. Each individual is unique. This standard of reference, could it be established, might enable us to distinguish the social from the organic elements of our nature. For reasons already given such a standard does not ordinarily exist. In only one peculiar condition (and this seems almost providentially arranged) do we find what may be regarded as a possible standard. This is seen in certain kinds of twinning.

You are familiar with the fact that children are born, not only singly, but in duplicate, triplicate, and still higher numbers. Some years ago I was interested in ascertaining the extent of these multiple births. So far as I could discover, the maximum number of children at a birth was six. A case of this kind is reported and a monument is raised to the mother in the town of Hamlin in Germany. I know of only one case of this kind. You will find in American medical records an instance of eight children born some fifty years ago in Ohio. This instance as recorded in several journals seemed to me on its face to be clear and indisputable, but when I showed it to a biological friend of mine, he expressed suspicions as to its correctness, and advised me to write to the county clerk of the region in which it was said to have occurred. Shortly thereafter I received a reply to my letter to the effect that the whole affair was a practical joke carried out by a person who apparently had some dislike for a family in which twins and triplets were not uncommon. This joker succeeded in putting into a local paper a circumstantial account of eight children born at one time in this family. From this obscure paper the case drifted into medical records and was accepted as true. It should be discarded and, so far as I know, the maximum number of six for human beings retained. I think you will agree with me that this is a sufficient number for any father to receive from his mate. These higher numbers are naturally of very rare occurrence. Twins have been recorded once in about every eighty-eight births, and it is to the twins particularly that I wish now to refer.

Twins are not always alike, in fact, we can easily distinguish two classes—first, those that are no more alike than are brothers and sisters in the same family. These are commonly called fraternal twins. They may be two boys, two girls, or a boy and a girl, but in any case, they have no more resemblance one to the other than other children in the family born separately. In contrast with these are identical twins, in which the two individuals are always of the same sex and always strikingly alike—so much so that they often

cannot be distinguished, even by their near relatives. In my youth in Philadelphia I knew two girls who were identical twins. It was always their habit out of politeness to mention their names when they approached you, for they were indistinguishable to us all. After maturity, one became engaged to a young man who suffered the common difficulty of all of us and who was often quite uncertain to which girl he was affianced. You may imagine the pranks that these youngsters played upon the young man, who finally succeeded in marrying the girl to whom he believed himself engaged. Literature is full of cases of this kind. The play of Plautus entitled the *Menaechmi* is based upon confusions dependent upon identical twins, and served as a basis for Shakespeare's "Comedy of Errors," in which the two Dromios and their masters are identical twins. The late Professor H. H. Wilder of Smith College was a very ardent and successful student of these conditions, and pointed out the remarkable degree of similarity between the members of such pairs. He showed that the finger prints and other minute personal details are strikingly alike, and he recorded a remarkable instance in which identical triplets had been born. These three girls were marvelously alike. Their mother maintained that she knew them apart, but she never allowed the children to lose strings of beads of different colors which were around their necks and which enabled her to determine quickly with which triplet she had to do. It was related that when these girls grew to an age where they were under a governess, two of them slipped away on a lark of their own, and persuaded the third to stay at home and be washed three times by the governess, who supposed that she was bathing one child after the other. This instance shows how remarkably similar in all physical aspects such individuals may be.

The explanation for the difference between fraternal and identical twins has gradually been unearthed. I may state it briefly as follows: Fraternal twins are the result of the fertilization of two separate eggs. They resemble the condition in lower animals in which any litter indicates the number of eggs fertilized. It so happens that some women discharge more than a single egg at a sexual period, and when this occurs they may produce two or more offspring at a time. The whole situation is a reversion to primitive methods of reproduction such as characterize many lower animals. Identical twins, on the other hand, are believed to arise from a single egg. The egg is fertilized, and in its growth, instead of producing one individual, it

produces two. It is not easy to get direct evidence of this in human beings, but such evidence as there is from the nature of the foetal membranes and other such aspects of human embryology point to the conclusion that the two identical twins have arisen from a single egg. Conclusive evidence on this point has been obtained from one of the lower animals, namely, the armadillo. In this animal, which is found in our Southwest, in Mexico and farther south, the rule is to produce four young at a time. These four are always of the same sex and possess physical traits which relate them as do the traits of identical twins. Any one of such a group of quadruplets resembles more closely the other members of the group than it does either of its parents. The germinal relations have been closely studied in the armadillo, and it is known beyond a doubt that the four young come from a single egg. There is every reason to believe that this is also true of identical twins in man.

From these considerations it is evident that in the case of identical twins we have a real standard for comparison. Identical twins spring from a common germinal source; they are the outcome of a single fertilized egg. From the standpoint of organic inheritance they should be expected to be exact duplicates. They therefore may be looked upon as standards, one for the other, and the differences that we may find in them may reasonably be expected to depend upon the environment; that is, upon social inheritance. It must be kept in mind, however, that many mothers dress their twins in much the same way and in many other respects treat them similarly; hence, under such circumstances, social conditions may impress such pairs in a way to make them strikingly alike. One must therefore not confuse similar elements from a social source with similar elements from a germinal one. You will see at once that a true comparison is best made in the case of identical twins which have been separated in their upbringing, and biologists within the last year or so have been especially interested in studying cases of this kind. From what I have said you will understand the great importance of studying identical twins brought up under different environments.

A few years ago Professor Muller, of the University of Texas, described an interesting case of this kind, and within the present year Professor H. H. Newman, of the University of Chicago, has described three such instances. One of these was of two girls born in London, England, and separated at the age of eighteen months.

One continued to live in her native region, while the other was carried across seas and spent much of her life in Canada. After seventeen years of separation they were brought together. The physical similarity was as striking as could be found in most cases of identicals. One had had greater educational opportunities than the other, and as might be expected, the intelligence tests gave to the one who had had the better opportunities a higher rating. In temperament the two were strikingly similar, a condition in contrast with the instances described by Professor Muller.

Another example recorded by Professor Newman was that of two young men born in an Illinois village and separated when only a few months old. They were brought together in a somewhat accidental way some twenty-two years after birth. The two have a striking physical similarity, which is especially attested by the finger prints. A pair of these are reproduced on the cover of the *Journal of Heredity* for last April, and they show in a most conclusive way the identity of the twins. Notwithstanding the striking physical similarity, the psychology of the two young men is markedly different. One was brought up in a large town, the other in a country situation. The town boy showed the effects of a better education, was more reserved, self-contained, experienced, and less friendly than his brother, who lacked a certain degree of dignity, laughed readily, and was much more the typical country boy. Here again the social inheritance appeared in a striking way and in those qualities that we should expect to have had such an origin.

It is perfectly clear, however, that many deep-seated traits of a kind far from physical belong to the germinal group. I have recorded two instances of identical twins, in both of which dementia praecox appeared at about the same time and ran the same course. I also have a record of identical twins, the illegitimate offspring of a vagrant mother, who were brought up separately in families of good repute, and who, nevertheless, became during school days truants, and later vagrants like the mother. By a strange coincidence they were brought together in the same penal institution for vagrancy. It is quite clear from these instances that germinal inheritance not only impresses upon us many of our bodily traits, but also touches the inmost springs of our nature and we must consider ourselves quite as much the product of germinal as of social inheritance. In consequence the old view that social opportunity is all that it is needful for the state to provide is being replaced by the belief that it is the

duty of the state to concern itself with germinal features as well as with social conditions.

We have had a long experience in adjusting social relations for the betterment of men, but we are complete novices in attempting to control the germinal inheritance. It is difficult to persuade legislators to see the significance and importance of the germinal aspect of population, but I am convinced that they will sooner or later, and better sooner than later. A few years ago the state of Massachusetts was said to be expending about one-fourth to one-fifth of its income on defective individuals. This income was used in the support of hospitals, asylums, and homes for those who were incapable of caring for themselves. Such individuals born into the community are not responsible for their presence there. They are members of the population, and call for reasonable and humane treatment. No state can afford to take drastic measures in relation to them, but their increase may well menace the welfare of any commonwealth. The question that arises is what is to be done for them. From a social standpoint they should be made as effective members of the community as can be, or, if they are incapable of any useful activity, they should be placed in an environment where as happy a life as can be given them is provided. It is nevertheless true that it would be within the province of any government to reach out its hand and prevent an increase in this type of individual at least when the defect from which he suffers has an hereditary basis. What steps can be taken by a state in controlling the increase of such individuals is difficult to say, but that some step must be taken is evident.

In experimenting on race betterment it seems quite clear that the place to begin is with the most defective members of society. Those who are state wards and must be cared for by state funds and whose defects are hereditary should in some way or other be restrained from reproduction. Such a step may be carried out by segregation, which has been advocated by many public custodians. Males should be kept in one asylum and females in another, and if the separation be complete and the individuals be not allowed to mix with the population at large, the prevention of offspring ought to be perfect. But it is well known that in institutions of this kind there are many border cases that pass out into the population and come back again, and in many instances the women of this kind return with child. Such a measure as segregation, while it has its advantages, has this serious disadvantage of being only an imperfect protection.

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A much more radical means of controlling defective individuals is sterilization. Sterilization is accomplished in the male by a very simple operation of excising small portions of the ducts leading from the testes to the exterior. This operation is not in any sense dangerous, and calls for little more than a slight incision in the skin. A similar operation on the oviducts of the female is more severe, and yet is not attended with serious consequences. Persons who have in this way been rendered incapable of procreation are in no sense restricted in their own activities. Sexual life proceeds with them as with normal individuals, excepting that no reproductive elements, eggs, or sperms, are involved. Consequently, while intercourse is possible, offspring never occurs. Sterilization by this process is radical and complete.

When sterilization is considered, it is always easy for one to point out who should be sterilized. We all know the personalities about us who are objectionable, and we can quickly point out the stocks that should not reproduce. But sterilization is an operation that should not be allowed to proceed excepting in proper hands. It is an operation that should be permitted only through a court medically advised. You may be interested to know that legal sterilization has already appeared on the statute books of over twenty states in the Union. It has taken a variety of forms in these various states and has not been very actively practised. California is perhaps the most forward of those that have adopted sterilization; it has had a eugenic sterilization law for some twenty years. There are already in California over six thousand cases of legal sterilization. These cases are practically always under state supervision. Some sociologists have urged that sterilization might produce a class of individuals, chiefly women, who would be misused by unscrupulous men, but this state of affairs does not seem to have materialized in California. The sterilized individuals are under more or less continuous supervision, and occupy positions in accordance with their abilities in every-day life. The situation is not one to cause alarm. The individuals thus treated lead in most instances what would be called normal lives. The California experiment and that which is beginning in other states will be watched with great interest, for it marks the first step in government control of organic human inheritance, the importance of which we are just learning to recognize.

THE NEW OFFICERS OF SIGMA XI

G. W. STEWART

The newly elected president of Sigma Xi was born in St. Louis, February 22, 1876. His undergraduate work was done at De Pauw University, where he received the degree of Bachelor of Arts in 1898. The degree of Ph.D. was conferred upon him at Cornell in 1901, and De Pauw has honored him with the degree of Doctor of Science. He has been instructor in Physics at Cornell, Assistant Professor and Professor of Physics at the University of North Dakota, and since 1909 Professor and head of the department of Physics at the University of Iowa, where he has also served as acting dean of the graduate college. Among the many researches which he has conducted are radiation, distribution of energy in spectra, relation between illuminating power, viscosity and density of kerosene oils, acoustic shadow of a sphere, ionization at metallic surfaces, binaural localization and heats, theory of the Herschel-Quinke tube, x-ray diffraction in liquids, the physical state of liquids, etc.

Professor Stewart is a Fellow of the A. A. A. S., a Fellow of the American Physical Society, a Fellow of the Acoustical Society of America, and a member of Phi Beta Kappa, and Phi Kappa Phi.

LEON J. COLE

Professor Cole is the newly elected member of the executive committee of the society. He was born in Allegany, N. Y., June 1, 1877. He received the degree of Bachelor of Arts from the University of Michigan in 1901, and the degree of Doctor of Philosophy from Harvard in 1906. He is a Fellow of the A. A. A. S., and a member of many scientific societies. He has been connected with the National Research Council in the division of biology.

Since 1910 he has been associated with the University of Wisconsin where he established the Department of Genetics and where since 1918 he has been Professor of Genetics. He has done much work on animal behavior, has been a special investigator for the U. S. Bureau of Fisheries, has been Chief of the Animal Husbandry Division of the Bureau of Animal Industry, and has contributed to scientific journals on zoölogy, animal behavior, and genetics.

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REPORT OF THE PRESIDENT FOR THE YEAR 1929

A. EXECUTIVE COMMITTEE:

A special meeting of the Executive Committee was held in New Haven on April 19 and 20. All of the officers and every member of the executive committee except one were present and in addition Dr. Utley, member of the Alumni Committee.

The time of the meeting was given almost wholly to the consideration of possible petitions:

1. *Five* of the petitioning groups were requested to present *formal* petitions for consideration at the December meeting.
2. *Official Visitors* were appointed to two institutions from groups in which informal petitions had been under consideration.
3. *Inquiries* from groups in 13 institutions were received and considered; upon which the committee voted that it was not ready to take further action at this time.
4. A scientific society (of geologists at Houston, Texas) which had made an inquiry about the possibility of a charter for a chapter was informed that the Constitution of the Society does not contemplate granting charters for chapters to that kind of organization.
5. Groups at five institutions were informed that the committee views with interest the conditions at those institutions and recommends the formation of a Sigma Xi Club at each center.
6. A group at a branch of a university—a branch geographically separated from the parent institution where there is already a chapter—were informed that petitions from each unit of a university, whatever its location, will be considered on its own merits.
7. The committee voted to make further inquiry regarding the faculty and equipment of a School of Medicine, connected with a university where at present there is no chapter.
8. The committee further voted that hereafter, when informal petitions are presented for consideration, they should be accompanied by letters from *three* chapters in the vicinity setting forth the conditions as viewed by these neighboring chapters.

B. ALUMNI FUND:

- (a) The executive committee voted to refer to the Treasurer with power the matter of the *amount* of the Research Fund to be put into the hands of the Committee of Award for the current academic year; but, in any case, the sum to be awarded *should not exceed* \$5000.00.
- (b) *The Committee of Award* granted approximately that sum to *eight* candidates as reported in the September issue of the QUARTERLY.

F. R. MOULTON, *President*

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REPORT OF THE SECRETARY FOR THE YEAR 1929

Following is a statistical account of some of the activities of the Secretary's Office during the calendar year 1929 with comments on certain phases of the work:

1. MEMBERSHIP:	1928	1929
A. Total Society.....	22,151	23,404 approx.
B. New members:		
(1) Members, about 804 (+ promoted associates = 875)*		
(2) Associates 449		

NOTE: Incomplete Returns:

1. Cards: None from:

Idaho
California
Maryland (except 3)

2. Lists: None from:

Yale	Purdue
Ohio	Texas (pending)
Brown	Idaho
Columbia	Oregon
Case	Johns Hopkins
Univ. of Washington	Lehigh

C. Number of chapters and clubs compared.

1928	1929
Chapters, 51 Clubs, 17	Chapters, 51 Clubs, 22

2. FILES:

A. Alphabetical:

With the addition of initiates' cards for this year, and the consequent additions to our master file, our present filing equipment is filled to capacity.

The following is the procedure for each card received for member or associate:

Member: When a card is received for a newly elected member—not a promotion from associateship—it is necessary to:

- a. Type 2 cards giving complete name, chapter, year of election, address—both residence and business if obtainable.
- b. Check the card received with chapter list received—if any, noting possible discrepancies in address.
- c. File one card in alphabetical, one in geographical file, and the card received in chapter file.

* Many chapters do not report promotions as such and until these cards are checked up and compared with our older files, they are counted as "new" members.

SIGMA XI QUARTERLY

If card received is illegible or defaced, it is necessary to make a new chapter card.

- d. If card received bears no address, the second card typed is filed in the "no address" file and name added to "missing persons" list. This obviously necessitates double work later—*i. e.*, a letter to obtain the present address, a notation of that, a re-filing of the card in the geographical file and correction of all 3 files besides the mailing list.

In the case of promoted members, a comparison is made with our file cards, change of address noted, a white substituted for a blue card in the chapter file and proper notation of chapter where promoted and the year, on the two general files—alphabetical and geographical.

NOTE: Multiply this work by the number of initiates, 1253, and one can see what this part of the work alone amounts to. Of course, accuracy and care in making notations and in keeping records up to date are absolutely necessary.

B. Geographical File:

It has been found that expansion in the "foreign" section has been so rapid that our present method of filing now used in United States and Canada must be extended to include other countries.

C. Chapter File:

1. This has been the best year for receipt of chapter file cards. Only three chapters outstanding: Idaho, California, Maryland. Of the last 3 cards have been received.
2. Cards still continue to come in without addresses, illegible (due to being carbon copies) and without indication of promotion—*i. e.*, whether the member is newly elected, or simply promoted from associateship.
3. The new chapters are especially to be commended for the co-operation they have shown in the work of the secretary's office.

D. No Address File: Reduced from 3200 to 2791 through *Journal of the American Chemical Society*, *Journal of the American Physical Society*, and alumni directories.

During the summer the secretary's office sent out 280 identity inquiries to clear up confusion of names in the files.

3. QUARTERLY:	1928	1929
A. Total number of pages:	111	111
B. Circulation:	Approx. 9000	7900 to 8000
Distributed as follows:		
Alumni contributors.	797	
Independent subscribers. . . .	11	
Chapter members.	6900 (approx. with 14 chapters yet unheard from for 1929)	

Alumni new to QUARTERLY list.....444

Alumni lost to QUARTERLY list.....201 (approx.—no address)

C. Mailing lists not received from:

Yale	Case
Ohio	Univ. of Washington
Brown	Purdue
Columbia	Texas
Oregon	Idaho
Johns Hopkins	Lehigh

D. Missing persons list:

1. This year for the first time the Secretary's office is publishing in each issue of the QUARTERLY a list of missing persons—approx. 80 to the issue—which, beginning with the "A's" of the "No Address" file will continue until the entire file will have appeared.

a. Responses average 5 daily; thus, in one year, at this rate, 1500 individuals would be heard from.

b. Responses called forth by this publication have exceeded expectations. Additional data available in such professional publications as the directory of the A. A. A. S., etc., the office has, as yet, not had opportunity to look up and verify. We hope to do this during the spring months.

4. ALUMNI MOVEMENT:

This year, circularization of alumni residing in New York City and vicinity was undertaken by the New York Alumni Association.

New York Report

Number of letters sent out..... 1166

Number of responses..... 103

Secretary's Office

1929 1928

Number of letters sent out..... 11,880 14,000

Number ret'd. undeliverable..... 772 788

Number of alumni responding..... 929 1348 of which 215 were 5-yr.

Percentage of responses—New York..... 10% plus

Schenectady..... 9% plus

5. INSIGNIA BUSINESS:

Total number key and pin orders received and filled:

	1929	1928
Number of keys.....	996	850
Number of pins.....	315	304
Total.....	1311	1154

6. RESEARCH GRANTS:

Applications received to date..... 9

7. MISCELLANEOUS BUSINESS OF THE OFFICE:

A.

Full member diplomas sent out.....	1800
Associate certificates sent out.....	1400
Blue and white index cards sent out.....	5430
Stationery sent out: 1380 sheets Sigma Xi paper 500 envelopes	

Copies of the Constitution: 78

B. Summer Inquiry Campaign:

Since it was found that the "no address" file numbered last summer some 3200 names, it seemed desirable to clear up as many addresses as possible (not obtainable through the missing persons list) by individual inquiries. The specific object of sending out approx. 280 of these sheets was to clear up cases where the records of the society showed two individuals of practically the same name, or nearly the same name with chapter and year of election identical, etc.

Replies have been received from 97% of these inquiries. We have been amazed to find that more than half of the persons written to, although bearing identical names—as members—are not and never have been members of Sigma Xi.

The above illustrates one of the many difficulties in connection with keeping the rolls of the society accurate and is in line with our effort to eliminate from the records all those not members who, through some error, have been reported from chapters—in most cases, many years ago.

C. Check-up of No-Address File:

By careful comparison with such publications as:

Journal of the American Chemical Society

Journal of the American Physical Society

Alumni Directories of Institutions

and similar publications, this office has been able to locate 300 members.

If time availed, more could be found through American Men of Science, A. A. A. S. Directory, etc.

EDWARD ELLERY, *Secretary*

REPORT OF THE TREASURER FOR THE YEAR 1929

The assessments of all chapters have been paid, except a small part of the assessment on the Cornell University chapter.

RECEIPTS

Cash on hand, Jan. 1, 1929.....	\$2473.65	
Chapter assessment for 1929.....	5532.49	
Chapter assessment, arrears 1928.....	262.00	
Initiation fees.....	1775.00	
Sale of QUARTERLY.....	29.00	
Interest on investments.....	652.89	
Interest on Savings Bank Account.....	10.41	\$10,735.44

DISBURSEMENTS

Secretary's office:		
Secretary's assistants.....	\$1936.50	
General.....	602.85	
Secretary's stipend.....	1800.00	
Treasurer's office:		
Clerical assistance, 1928.....	25.00	
Clerical assistance, 1929.....	75.00	
Stamps.....	10.00	
Officers' travel expense.....	472.54	
QUARTERLY (4 issues).....	1541.49	
1 Western Electric Co. 5% bond.....	1029.50	
1 Philadelphia Co. 5% bond.....	997.50	
1 New York Central 6% bond.....	1032.00	
Interest on above three bonds accrued.....	76.27	
Cash on hand, January 1, 1930.....	1137.29	\$10,735.44

INVESTMENT ACCOUNT—GENERAL

(Securities carried at cost)

\$1000 Amer. Tel. & Tel. Co. 5½% bond, carried at.....	\$1037.44
\$1000 Amer. Tel. & Tel. Co. 5% bond carried at.....	991.94
\$1000 Consolidated Gas of New York 5½% bond, carried at.....	1002.90
\$1000 St. Louis and San Francisco Railway 4% bond carried at.....	796.35
\$1000 Baltimore & Ohio Railroad 5% bond, carried at..	955.00
\$1000 Pacific Gas and Electric Co. 5½% bond, carried at.....	1045.00
\$1000 Philadelphia Co. 5% bond, carried at.....	979.50

\$1000 Erie Railroad Co. 5% bond, carried at.....	947.00	
\$1000 Southern Railway Co. 6% bond, carried at.....	1152.00	
\$1000 Western Elec. Co. 5% bond, carried at.....	1029.50	
\$1000 Philadelphia Co. 5% bond, carried at.....	997.00	
\$1000 New York Central 6% bond, carried at.....	\$1032.00	\$11,965.03

ALUMNI FUND

RECEIPTS

Cash on hand, Jan. 1, 1929.....	\$3813.77	
Receipts from subscriptions.....	3097.56	
Interest on bonds.....	67.11	\$6978.44

DISBURSEMENTS

Research:

Professor Carl L. A. Schmidt.....	\$437.50	
Mr. Arthur A. Vernon.....	468.75	
Miss Joyce Hedrick.....	300.00	
Miss A. Elizabeth Adams.....	100.00	
Professors Davey and Ham.....	300.00	
Dr. Robert G. Aitken.....	500.00	
Professor William H. Cole.....	200.00	
Professor Arthur A. Bless.....	125.00	
Professors Taylor, Clark, and Luck.....	1000.00	
Dr. Dorothea Eggleston Smith.....	200.00	\$3631.25

1 Dominion of Canada 5% bond.....	999.50	
1 Southern Pacific Co. 4 $\frac{1}{2}$ % bond.....	905.75	
1 Southern Pacific Co. 4 $\frac{1}{2}$ % bond.....	907.00	
Cash on hand, January 1, 1930.....	534.94	\$6978.44

ALUMNI INVESTMENT ACCOUNT

(Securities carried at cost)

\$1000 Dominion of Canada 5% bond, carried at.....	\$999.50	
\$1000 Southern Pacific Co. 4 $\frac{1}{2}$ % bond, carried at.....	905.75	
\$1000 Southern Pacific Co. 4 $\frac{1}{2}$ % bond, carried at.....	907.00	\$2812.25

December 31, 1929

GEORGE B. PEGRAM, Treasurer

We have audited the accounts of the Treasurer of the Society of Sigma Xi for the year ending December 31, 1929, and certify that the income shown by the books of the Treasurer has been duly accounted for, that payments have been properly vouched and that the balance-sheet and accounts submitted contain a true statement of the financial condition of the Society. We have also examined the securities in the hands of the Treasurer and find the following bonds: \$1000 American Telephone and Telegraph Co., \$1000 American Telephone and Tele-

REPORT OF THE TREASURER

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graph Co., \$1000 Consolidated Gas of New York, \$1000 St. Louis and San Francisco Railway, \$1000 Baltimore and Ohio Railroad, \$1000 Pacific Gas and Electric Co., \$1000 Philadelphia Co., \$1000 Erie Railroad Co., \$1000 Southern Railway Co., \$1000 Western Electric Co., \$1000 Philadelphia Co., \$1000 New York Central, \$1000 Dominion of Canada, \$1000 Southern Pacific Co., \$1000 Southern Pacific Co.

FREDERICK W. HEHRE
WALTER A. CURRY

Auditors

Date, February 14, 1930

M, Treasurer

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CHAPTER OFFICERS
LIST FURNISHED BY THE SECRETARIES OF THE CHAPTERS

CHAPTER	PRESIDENT	VICE-PRES.	SECRETARY	TREASURER
Cornell.....	F. O. Ellenwood	H. H. Love....	W. A. Hagan...	A. J. Heinicke
Rensselaer....	R. A. Patterson	F. W. Schwartz	F. M. Sebast...	H. E. Stevens
Union.....	M. F. Sayre...	F. W. Grover...	C. B. Hurd....	C. B. Hurd
Kansas.....	E. B. Stouffer..	H. H. Lane.....	J. D. Stranathan	H. E. Jordan
Yale.....	S. R. Brinkley..	J. S. Nicholas..	A. F. Hill.....	A. T. Waterman
Minnesota....	C. M. Jackson..	O. E. Harder...	J. W. Buchta...	C. O. Rost
Nebraska.....	N. A. Bengston.	G. L. Peltier...	E. N. Andersen.	M. G. Gaba
Ohio.....	J. E. Carman...	P. W. Ott.....	F. A. Hitchcock	F. A. Hitchcock
Pennsylvania..	R. H. True.....	R. H. Fernald...	H. S. Oberly...	W. R. Taylor
Brown.....	A. E. Watson...	W. H. Snell....	C. W. Miller...	C. E. Bennett
Iowa.....	J. T. McClintock	J. F. Reilly....	Lee Travis.....	G. W. Martin
Stanford.....	E. W. Schultz..	Mary I. McCracken....	M. L. Huggins..	M. L. Huggins
California....	E. D. Merrill...	C. W. Porter...	S. K. Allison...	F. H. Cherry
Columbia....	A. T. Poffenberger.....	L. T. Work....	Walter A. Curry	Walter A. Curry
Chicago.....	E. O. Jordan...	E. S. Bastin...	T. F. Young....	T. F. Young
Michigan.....	H. M. Randall..	H. E. Lewis....	C. E. Guthe....	R. C. McAlpine
Illinois.....	A. B. Coble....	R. Graham.....	J. E. Lamar....	J. O. Draffin
Case.....	F. R. VanHorn.	T. D. Owens...	J. R. Martin...	T. M. Focke
Indiana.....	J. E. Switzer...	D. A. Rothrock	Lila Curtis....	Paul Weatherwax
Missouri.....	Edgar Allen...	M. G. Mehl....	A. E. Stearn...	H. H. Charlton
Colorado.....	A. J. Kempner.	Edna Johnson.. (Denver)	G. Wakeham...	F. S. Bauer....
		R. Whitehead..		
Northwestern	S. W. Ransom..	J. B. Morgan...	L. I. Bockstahler.....	Lois W. Griffiths
Syracuse.....	C. C. Forsaith	C. C. Carpenter	D. P. Randall..	R. R. Hirt
Wisconsin....	H. A. Schuette.	W. D. Stovall..	R. C. Williamson.....	H. P. Aldrich
University of Washington	R. C. Miller...	Hewitt Wilson..	G. E. Goodspeed	V. Sivertz
Worcester....	G. H. MacCullough.....	J. W. Howe....	H. J. Gay.....	F. R. Butler
Purdue.....	R. G. Dukes...	M. W. Gardner.	T. E. Mason...	R. B. Abbott
Washington University..	P. A. Shaffer..	A. S. Langsdorf.	E. S. Reynolds.	L. F. Thomas
District of Columbia...	C. R. Ball.....	R. H. Bogue...	G. L. Keenan...	M. G. Zehner
Texas.....	H. J. Muller..	H. L. Lochte...	C. P. Boner	Arnold Romberg
Mayo Foundation....	H. E. Robertson	W. Boothby...	A. E. Osterberg	A. E. Osterberg
N. Carolina...	F. K. Cameron.	J. H. Swartz...	J. N. Couch...	J. N. Couch
N. Dakota...	E. E. Hams...	H. E. French...	E. A. Baird...	E. A. Baird
Iowa State College (formerly Ames)	E. W. Lindstrom.....	Laura McLaughlin....	E. I. Fulmer...	J. W. Woodrow

CHAPTER

Rutgers...
McGill...

Kentucky
Idaho....

Swarthmore
Oregon...
Virginia...
Johns Hop

Calif. Insti
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New York
Universi
Univ. of
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Mich. Stat
College.

Arizona...
Lehigh...
Maryland
Kansas St
College.

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CHAPTER OFFICERS (*Continued*)
LIST FURNISHED BY THE SECRETARIES OF THE CHAPTER

CHAPTER	PRESIDENT	VICE-PRES.	SECRETARY	TREASURER
Rutgers.....	G. H. Brown...	T. C. Nelson...	R. L. Starkey..	T. J. Murray
McGill.....	H. M. Mackay.	W. G. McBride.	G. W. Scarth...	John Beattie
		F. E. Lloyd....		
Kentucky....	W. R. Allen....	W. W. Dimock..	M. N. States...	D. V. Terrill
Idaho.....	E. E. Hubert...	A. W. Fahrenwald.....	L. C. Cady....	Ella Woods
		S. C. Palmer...	H. J. Creighton	H. J. Creighton
Swarthmore..	Arnold Dresden	G. E. Burget...	Ethel Sanborn..	H. G. Tanner
Oregon.....	E. H. McAllister	A. F. Benton...	J. K. Roberts..	J. K. Roberts
Virginia.....	W. A. Kepner..	A. W. Schultz..	M. W. Pullen..	F. D. Murnaghan
Johns Hopkins	S. R. Damon...			
Calif. Institute of Technology	R. W. Sorensen	P. W. Merrill..	W. V. Houston.	L. C. Pauling
New York University..	H. W. Stunkard	B. G. Smith...	R. T. Cox.....	R. T. Cox
Univ. of Cincinnati.....	G. D. McLaughlin.....	W. H. Bucher..	S. B. Arenson..	S. B. Arenson
Mich. State College.....	V. R. Gardner..	C. S. Robinson.	E. D. Devereux	E. F. Woodcock
Arizona.....	E. D. Ball.....	A. K. Ludy....	J. C. Clark....	J. C. Clark
Lehigh.....	B. L. Miller...	M. C. Stuart...	G. E. Doan....	C. C. Bidwell
Maryland....	H. J. Patterson.	A. N. Johnson..	M. M. Haring..	M. M. Haring
Kansas State College.....	H. H. King....	Mary T. Harman.....	C. W. Colver...	M. C. Sewall
Col. of Medicine, Univ. of Illinois...	H. A. McGuigan	F. E. Senear...	W. H. Welker..	I. Pilot.....

TREASURER

Heinicke
Stevens
Hurd
Jordan
Waterman
Rost
G. Gaba
Hitchcock
R. Taylor
Bennett
W. Martin
L. Huggins
Cherry
A. Curry
F. Young
C. McAlpine
D. Draffin
M. Focke
Weather-
vax
H. Charlton
S. Bauer....

is W. Griffiths

R. Hirt
P. Aldrich

Sivertz
R. Butler

B. Abbott

F. Thomas

G. Zehner
Arnold Romberg

E. Osterberg
N. Couch
A. Baird

W. Woodrow

SIGMA XI CLUBS

CLUB	PRESIDENT	VICE-PRES.	SECRETARY	TREASURER
Oklahoma...	C. N. Gould...	L. E. Harris...	Wm. Schriever	Wm. Schriever
Southern California...	F. J. Smiley...	W. J. Schmidt...	H. de Forest...	H. de Forest
Duluth...			E. W. Kelly...	
Carleton College...	C. H. Gingrich	E. O. Ellingson	H. P. Klug...	H. P. Klug
University of Denver...	T. R. Garth...	R. E. Nyswander	E. A. Engle...	W. H. Hyslop
Oregon State Agricultural College...	R. A. Osborn...		H. R. Laslett	H. R. Laslette
West Virginia University...	A. M. Reese...	J. H. Gill...	R. P. Davis...	
University of Maine...	D. B. Young...	C. R. Phipps...	C. B. Crofutt...	C. B. Crofutt
University of Pittsburgh...	O. H. Blackwood	L. P. Sieg...	A. E. Emerson	A. E. Emerson
University of Wyoming...	Aven Nelson...	J. A. Hill...	O. H. Rechard	O. H. Rechard
University of Florida...	J. R. Benton...	O. F. Burger...	O. C. Bryan...	O. C. Bryan
University of Rochester...	W. R. Bloor...	W. L. Berry...	L. C. Boynton...	L. C. Boynton
Colorado Agricultural College...	G. T. Avery...	L. D. Crain...	L. W. Durrell...	L. W. Durrell
State College of Washington...	H. E. Culver...		Hannah C. Aase	
University of So. Dakota	E. P. Rothrock			
Louisiana State Univ.	L. J. Lassalle...	H. V. Howe...	E. H. Behre...	E. H. Behre
University of Alabama...	E. B. Carmichael...	B. A. Wooten...	B. P. Kaufmann	B. P. Kaufmann
University of Arkansas...	E. Wertheim...	George Janssen	Jewell Hughes	Jewell Hughes
University of California at Davis...	T. I. Storer...		E. L. Proebsting	E. L. Proebsting
University of Utah...	Elton Quinn...	I. B. Burns...	T. C. Adams...	
Clark University...	R. H. Goddard		O. W. Richards	O. W. Richards
St. Louis University...	Rev. J. B. Macelwane, S. J.		M. S. Fleisher	
Connecticut Agr. College	R. E. Dodge...	F. A. Ferguson	W. N. Plastridge...	W. N. Plastridge...
Miami Univ.	Clarence Kreger		B. M. Davis	
Univ. of Ga.	A. S. Edwards...		M. W. Lowry...	
Bucknell University...	S. C. Ogburn, Jr.		W. N. Lowry	W. N. Lowry
Duke Univ...	C. C. Hatley...	W. C. Vosburgh	F. A. Wolf...	F. A. Wolf...

TREASURER

m. Schriever

de Forest

P. Klug

H. Hyslop

R. Laslette

B. Crofutt

E. Emerson

H. Rechard

C. Bryan

C. Boynton

W. Durrell

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